authentication interval, determining the sequence of gaps in which barker codes were found and identifying the remote unit which transmitted the signature sequence by the sequence of gaps in which barker codes were found and silences in said authentication interval and broadcasting said identity so found from said central unit;

(g) receiving said identity broadcast in the remote units which are performing said ranging process and, in each remote unit, comparing the identity broadcast to the remote unit's identity, and, if a match is found, performing a fine tuning process to exactly center a barker code transmission in a gap using one or more messages received from said central transceiver containing adjustment data so as to achieve precise frame synchronization.

REMARKS

Prior Art

Some of the claims added by this preliminary amendment which do not require ranging gaps between every frame in the upstream transmissions are similar to DOCSIS 1.0 ranging which dates back to approximately 1997 or 1998. However, the ranging disclosures of the specification date back to a parent case serial number 08/519,630 filed in 8/25/95 so the DOCSIS 1.0 modems are not believed to be prior art.

In the enclosed IDS, the "Seki: A Wireless Multimedia Network on a Time Division DuplexCDMA/TDMA" published in IEICE Transactions On Communications, Vol. E78-8, No. 7 July 1995 and U.S. patent 5,327,455 were apparently the most pertinent references to the EPO examiner in the TER-002.2P parent case EPO version on a claim set directed to an RU upstream synchronous CDMA method including a ranging step to achieve frame synchronization. The claims presented herein are directed to ranging and training processes standing alone regardless of whether the upstream

multiplexing is CDMA or TDMA. The Seki reference teaches that it is known to teach a bidirectional wireless digital data communication system with a plurality of distributed remote units that communicate with a central unit. The central unit is coupled to an ATM local area network and transmits high speed video signals to the remote units via a TDMA downstream. Each frame in the downstream includes an interval devoted to CDMA upstream signals. Low speed human interface signals such as keyboard input, mouse input etc. to interact with the central unit are direct sequence spread with a unique spreading code assigned to each remote unit. The central unit uses a bank of CDMA receivers, each of which demultiplexes the CDMA signals received from one remote unit during the CDMA interval.

U.S. patent 5,327,455 teaches a transmitter for synchronous code division multiplexed satellite communications. The manner of achieving code synchronization is not taught and is said to be conventional. There is no teachings of transmitting data in frames, and no teaching of the need for or any manner of achieving frame synchronization. The patent teaches encoding an incoming bit stream to generate multiple symbols per bit and then mapping the symbols in PSK modulator to points in a constellation with, for example, a Trellis encoder, such that inphase and quadrature bit streams are generated. Each of the separate inphaseand quadrature bit streams is separately spread with a semi-orthogonal spreading code. The resulting spread spectrum data is conventionally modulated onto two quadrature carriers which are summed and transmitted.

Specification Amendments

The amendment to specification page 143, line 26 is made to make clear that which would be apparent to one skilled in the art as inherently necessary in an upstream

training process where tap coefficients of a central transceiver modem are trained and later sent down to the RU transmitter to be used there to calculate new RU precoder filter tap coefficients so as to predistort the transmitted signal so that it will arrive already equalized. Since step 1126 of Figure 53B teaches setting the coefficients of the central transceiver modem symbol equalizer circuit to one after transferring the converged coefficients to the remote transceiver transmitter, one skilled in the art would understand that the central transceiver modem is not equalizing, so the remote transceiver must be doing the equalizing for its particular signal path for that is the reason for the transfer of the converged coefficients back down to the RU. Therefore, it would be necessary during the convergence process for the RU transmitter to not predistort the equalization training data in some embodiments, and one skilled in the art would understand this. Obviously, after the transfer of the SE converged coefficients from the CU SE circuit to the RU precode filter, the RU precode filter is doing the equalization for this RU, and it is necessary to set the CU SE filter coefficients to values which render it transparent so as to not goof up the equalization being performed by the RU precode filter. Further, the software appendices of the parent case, U.S. patent application entitled "APPARATUS AND METHOD FOR SCDMA DIGITAL DATA TRANSMISSION USING ORTHOGONAL CODES AND A HEAD END MODEM WITH NO TRACKING LOOPS", serial number 08/895,612, filed 7/16/97, define a system with remote transceiver and central transceiver modems that act in this way. This amendment should not raise new matter issues, but if the Examiner disagrees, the courtesy of a telephone call to the undersigned is respectfully requested.

The same comments apply to the amendment to page 144, line 17 with the additional comment that one skilled in the art of equalization in distributed digital data

transmission systems would realize that it was an error to say that all the taps of the FFE and DFE equalization filters are set to one after convergence and transfer of the converged tap coefficients to the RU since this is an obvious error. One skilled in the art would realize that only the main tap of the FFE is set to one and the side taps of the FFE and DFE are set to zero to receieve payload data.

The amendment at page 144, line 8 conforms the description of step 1124 in the upstream equalization process embodiment of Figure 53B for the CDMA specific transmitters disclosed herein to step 1514 of the process of Figure 60 which is an equalization process which is useful in any distributed digital data system with multiple transmitters transmitting to a singe central transceiver transmitter over different paths regardless of the type of multiplexing in use. Those skilled in the equalization art would realize that the original description of step 1124 was erroneous in not mentioning convolving the old coefficients with the new coefficients. Further, the software appendices of the parent case, U.S. patent application entitled "APPARATUS AND METHOD FOR SCDMA DIGITAL DATA TRANSMISSION USING ORTHOGONAL CODES AND A HEAD END MODEM WITH NO TRACKING LOOPS", serial number 08/895,612, filed 7/16/97, define a system with remote transceiver and central transceiver modems that act in this way. This amendment should not raise new matter issues, but if the Examiner disagrees, the courtesy of a telephone call to the undersigned is respectfully requested.

The change to page 145, lines 10-13 is made to correct an error that persons skilled in the art of equalization would have readily understood was made in the description of how the new CE equalization circuit coefficients are calculated after convergence of the SE coefficients. Persons skilled in the art would appreciate that the new RU receiver SE coefficients cannot be loaded directly into the RU CE equalizer

circuit but must, instead, be convolved with the old CE circuit coefficients to generate the new CE coefficients. Further, this amendment conforms the description of the process of Figure 53C to the process described in Figure 60 and the accompanying text. Further, the software appendices of the parent case, U.S. patent application entitled "APPARATUS AND METHOD FOR SCDMA DIGITAL DATA TRANSMISSION USING ORTHOGONAL CODES AND A HEAD END MODEM WITH NO TRACKING LOOPS", serial number 08/895,612, filed 7/16/97, define a system with remote transceiver and central transceiver modems that act in this way. This amendment should not raise new matter issues, but if the Examiner disagrees, the courtesy of a telephone call to the undersigned is respectfully requested.

The same comments made regarding the change to page 143, line 26 apply to the change made to page 170, line 14 since a person skilled in the art would realize that after the CU SE filter coefficients have converged and its coefficients have been sent to the RU to generate new precode filter coefficients there by convolving with the old coefficients of the precode filter, it is necessary to set the SE coefficients in the CU receiver to values such that the CU SE does not screw up the equalization now being performed by the RU precode filter. Those skilled in this art know that those tap coefficients are one for the SE FFE main tap and zero for the SE FFE and DFE side taps. No new matter is believed to be raised by this amendment.

The changes to pages 169 and 170 simply correct duplicate reference numbers which refer to different process steps.

The change to page 170, line 14 simply corrects an error which would have been detected by persons skilled in the art of equalization. After the coefficients of the SE circuit have converged and have been convolved with the old CE coefficients to derive new

CE coefficients, the SE coefficients must be set to main tap = 1 and side taps = 0 since to not do so would result in the equalization being done in the RU precode filter in the case of upstream transmissions or the RU CE circuit in the case of downstream transmissions being screwed up by the SE circuit in the RU. Persons skilled in the art appreciate that after the new precode or CE coefficients have been set, the SE coefficients need to be set to a transparent state of main tap = 1 and side taps = 0 so that the SE circuit is transparent (and can start to reconverge on subsequent iterations or periodic updates of the precode or CE coefficients).

Respectfully submitted,

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(Date of Deposit)

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UPSTREAM EQUALIZATION

CU SENDS MESSAGE TO RU TELLING IT TO SEND EQUALIZATION DATA TO CU USING ALL 8 OF THE FIRST 8 ORTHOGONAL CYCLIC CODES AND BPSK MODULATION.

1116

RU SENDS SAME TRAINING DATA TO CU ON 8 DIFFERENT CHANNELS SPREAD BY EACH OF FIRST 8 ORTHOGONAL CYCLIC CODES.

1118

CU RECEIVER RECEIVES DATA, AND FFE 765, DFE 820 AND LMS 830 PERFORM ONE INTERATION OF TAP WEIGHT(COEFFICIENT) ADJUSTMENTS.

1120

TAP WEIGHT (COEFFICIENT) ADJUSTMENTS CONTINUE UNTIL CONVERGENCE WHEN ERROR SIGNALS DROP OFF TO NEAR ZERO.

1122

AFTER CONVERGENCE DURING TRAINING INTERVAL, CU SENDS FINAL FFE AND DFE COEFFICIENTS TO RU.

IN CU

1124

~~RU~~ ~~SETS~~ CONVOLVES FINAL FFE & DFE COEFFICIENTS ~~INTO~~ SE CIRCUIT WITH OLD PRECODE FFE/DFE FILTER IN TRANSMITTER COEFFICIENTS AND LOAD NEWLY CALCULATED COEFFICIENTS INTO RU XMTR PRECODE FILTER

RU

TRANSPARENCY VALUES

1126

CU SETS COEFFICIENTS OF FFE 765 AND DFE 820 TO ~~ONE~~ FOR RECEPTION OF UPSTREAM PAYLOAD DATA.

TO FIG. 45C

FIG. ~~45B~~ ~~54B~~ 53B

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DOWNSTREAM EQUALIZATION

FROM FIG. 45B

1128

CU SENDS EQUALIZATION TRAINING DATA TO RU SIMULTANEOUSLY ON 8 CHANNELS SPREAD ON EACH CHANNEL BY ONE OF THE FIRST 8 ORTHOGONAL CYCLIC CODES MODULATED BY BPSK.

1130

RU RECEIVER RECEIVES EQUALIZATION TRAINING DATA IN MULTIPLE ITERATIONS AND USES LMS 830, FFE 765, DFE 820 AND DIFFERENCE CALCULATION CIRCUIT 832 TO CONVERGE ON PROPER FFE AND DFE TAP WEIGHT COEFFICIENTS.

1132

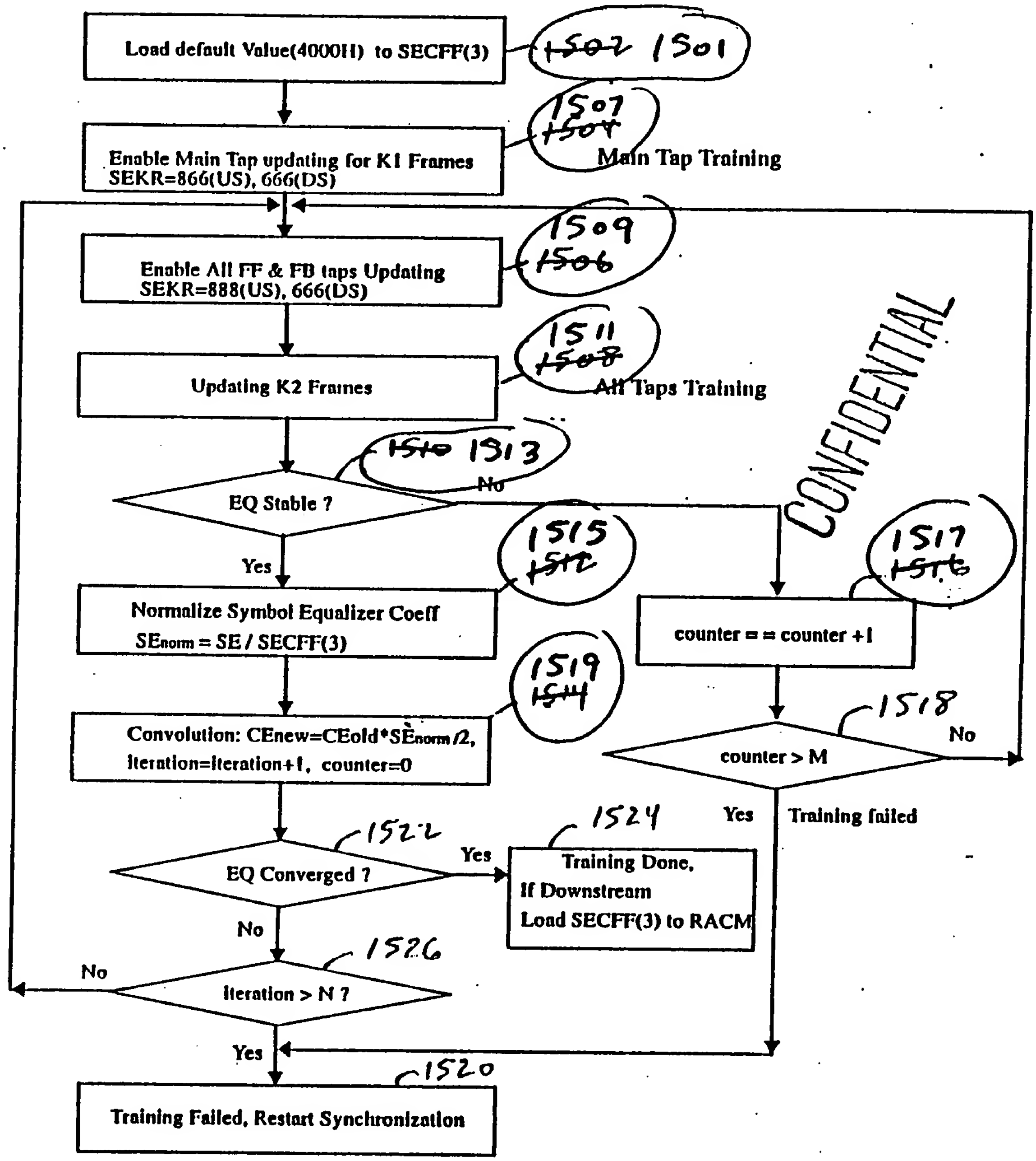
AFTER CONVERGENCE, CPU READS FINAL TAP WEIGHT COEFFICIENTS FOR FFE 765 AND DFE 820 AND CONVOLVES THESE SE FILTER TAP WEIGHTS WITH THE OLD FILTER TAP WEIGHTS OF THE FFE AND DFE FILTERS OF CE CIRCUIT 764 AND LOADS THE NEWLY CALCULATED TAP WEIGHTS INTO THE FFE AND DFE FILTERS OF THE CE CIRCUIT ~~LOADS THESE TAP WEIGHT COEFFICIENTS INTO FFE/DFE CIRCUIT 764~~; CPU SETS FFE 765 AND DFE 820 COEFFICIENTS TO INITIALIZATION VALUES.

54C

FIG. ~~45C~~

53C

Initial 2-Step Training Algorithm



2-STEP INITIAL EQUALIZATION TRAINING
FIG. 60